

[54] **LOADING APPARATUS FOR CRIMPER ROLLS**

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[52] **U.S. Cl. 28/269**

[58] **Field of Search 28/1.6, 1.7, 72.14, 28/269**

[56]

References Cited

U.S. PATENT DOCUMENTS

3,162,924	12/1964	Richeson	28/1.6
3,225,415	12/1965	Stoveken et al.	28/1.6
3,298,079	1/1967	Agett et al.	28/1.6
3,639,955	2/1972	Fleissner et al.	28/1.6

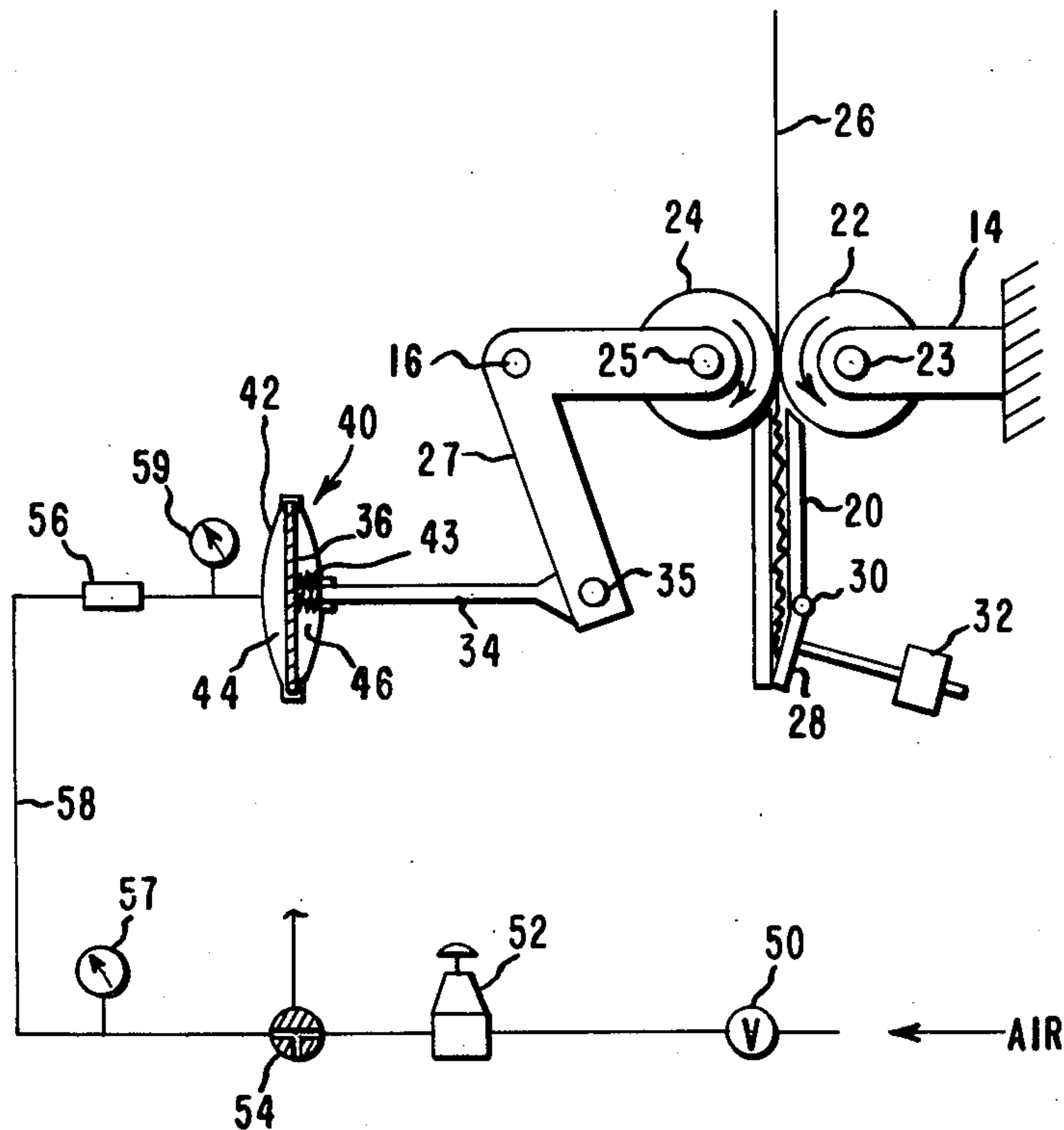
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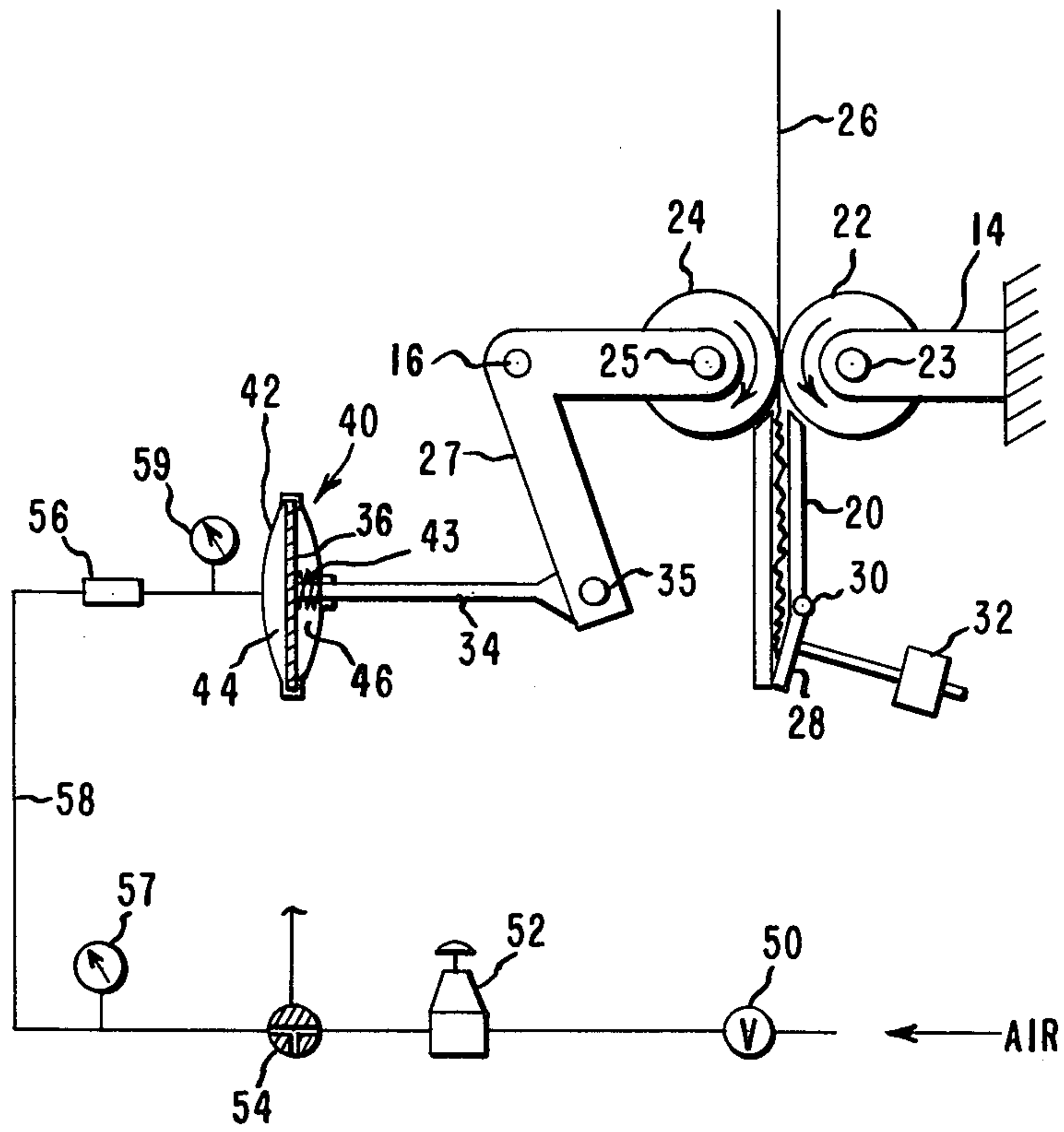
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ABSTRACT

A tow crimping apparatus that includes a pair of advancing rolls associated with a crimping chamber is provided with a movable roll to permit controlled loading of the nip between the rolls. The controlled loading is accomplished through a pressure chamber linked to the movable roll and having a restricter in the pressure supply line to the pressure chamber.

5 Claims, 1 Drawing Figure





LOADING APPARATUS FOR CRIMPER ROLLS

BACKGROUND OF THE INVENTION

This invention relates to an apparatus for crimping 5
filamentary tow and more particularly to a loading
arrangement for one of the forwarding rolls used to feed
the tow into a stuffing box crimper.

It is well known in the art to crimp synthetic filaments 10
that are to be processed either as broken tow or cut
staple on textile processing equipment to yield yarns
useful in the manufacture of fabrics. Without crimp, the
tow or staple has low cohesiveness and cannot be
drafted to uniform yarns on commercial textile equip-
ment. One form of apparatus for crimping of filaments is 15
the stuffing box crimper described in U.S. Pat. No.
2,747,233.

The crimping process usually is operated under condi-
tions so critical that minor variations in the process 20
can lead to crimper upsets which can result in severe
product property variations such as unsatisfactory fiber
properties and inadequate crimp.

A process variable that tends to give crimper upsets is 25
the short term variations in crimper feed-rope denier
resulting from merging of new ends with run-out tails of
the old. Even if merges are staggered so that no two
occur in parallel, the short-length increase in overall
rope size can be sufficient, especially in high-speed
processes, to initiate roll-clearance oscillations and out-
of-control crimping during processing of several yards 30
of rope. This problem was recognized by Stoveken and
Talbott in their U.S. Pat. NO. 3,225,415, which teaches
a sophisticated means to restore equilibrium operation
following an upset.

SUMMARY OF THE INVENTION

In an apparatus for crimping filamentary tow includ-
ing a pair of driven rolls cooperating to form a nip
between the rolls through which tow passes to a
crimper chamber associated with said rolls, one of said 40
rolls being movable with respect to the other to form an
adjustable width nip, the improvement comprising: a
loading device having a flexible diaphragm dividing a
single chamber into a front chamber and a sealed back
chamber; a source of pressurized air in communication 45
with the back chamber; a gas flow restrictor connected
between said source and said back chamber adjacent to
said back chamber; and a linkage passing through said
front chamber connected between the central portion of
said diaphragm and said movable roll.

BRIEF DESCRIPTION OF THE DRAWING

The FIGURE is a schematic side elevation view of a
stuffer box crimper coupled to the roll loading system
of this invention.

DETAILED DESCRIPTION OF THE
PREFERRED EMBODIMENT

The crimper chosen for purposes of illustration in-
cludes a stuffing box 20, a pair of crimper rolls 22, 24 60
associated with and located above the entrance to the
stuffing box for feeding a tow of filamentary material 26
into the box. The bottom of the stuffing box 20 is closed
by a clapper 28 which pivots about pin 30 and is under
a controlled degree of loading schematically shown as
weight 32. Roll 22 is rotatably mounted on pin 23 in
fixed bracket 14 and driven by means not shown while
roll 24 is rotatably mounted on pin 25 in one leg of

L-shaped arm 27 which is pivotally mounted for swing-
ing movement about pin 16 at the apex of the arm 27.
The other leg of arm 27 is pivotally connected to one
end of rod 34 through pin 35. The other end of rod 34
is connected to the central portion of flexible diaphragm 5
36 of loading device 40. Thus, the rod 34 and the arm 27
and associated pins 16, 25 and 35 form a linkage be-
tween diaphragm 36 and roll 24. The loading device 40
(typically a Robotair Chamber Type 3 by Bendix-West-
inghouse) comprises a housing 42 divided into a front
chamber 46 and a back chamber 44 by diaphragm 36. A
return spring 43 is positioned against diaphragm 36 in
front chamber 46. The back chamber or pressure cham-
ber 44 is in communication with a source of pressurized
air through valve 50, pressure regulator 52, three-way
valve 54 and restrictor 56 located adjacent to the load-
ing device 40 all serially connected in pipeline 58. Re-
strictor 56 limits the flow of air to or from back chamber
44 and is in the form of a sintered metal plug which can
be a Pressure Snubber No. 25S supplied by Chemiquip
Products Co., Inc. Gages 57 and 59 are tied into pipeline
50 to indicate (1) pressure supplied to chamber 44 and
(2) the pressure between the chamber 44 and the re-
strictor 56, respectively.

In operation, when a short section of larger-denier
tow passes between rolls 22 and 24, roll 24 is moved
away from roll 22 compressing the air in chamber 44 to
a higher pressure than indicated by gage 57 via the
linkage of arm 27 and rod 34. Air immediately begins to
flow through restrictor 56 into supply line 58 but at a
slow rate. When the larger-denier section of tow has
passed rolls 22, 24, the immediate need is to restore roll
24 to its just-previous equilibrium position. The higher
pressure developed in chamber 44 by the displacement 30
of roll 24 tends to restrict displacement of roll 24 and
most of it remains as higher-than-normal pressure acting
to restore equilibrium.

The combination of a single-acting loading device 40
and a restrictor 56 in the actuating air line is more effec-
tive in restoring equilibrium operation following an
upset than the more complex double-acting prior art
devices.

Benefits are seen with more uniform crimping with
the improved crimping apparatus of this invention. For
example, it has been found that two crimpers, operating
side-by-side under the same conditions with the same
filamentary product will deliver crimped tows of nearly
identical water and textile finish content, which was not
attainable with art-known crimpers. This is a substantial
advantage since predictable textile processability is
dependent on uniformity in both finish and water con-
tent. Crimped rope (or staple) of uniform moisture con-
tent dries more uniformly in a given process than does
rope or staple with variable, or different, moisture con-
tent. In one large-scale comparison of processabilities
on a Turbo Stapler, a commercial machine for draft-
breaking of tow to sliver, the operator found it neces-
sary to stop the machine an average of 1.37 times per
1000 pounds (3.03 times/Mg) while processing about
55,000 pounds (~25,000 kg) of 470,000-denier (52,170
tex) tow that had been processed through a more com-
plex crimper previously known in the art as 340,000-
denier (37,740 tex) drawn rope (the higher denier of the
tow being due to process relaxation after draw). In two
tests, involving about 63,000 pounds (~29,000 kg) and
about 89,000 pounds (~40,000 kg) of the same size tow
processed through the crimper of this invention, ma-
chine stops averaged 0.74/1000 pounds (1.64/Mg) and

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0.66/1000 pounds (1.45/Mg), respectively. It is well recognized in the trade that tow quality is the major factor in continuity of this operation. Reduction to about half-normal machine stops means a significant saving in labor, less fiber waste and more uniform-quality yarns.

What is claimed is:

1. In an apparatus for crimping tow including a pair of rolls cooperating to form a nip between the rolls through which tow passes to a crimper chamber associated with said rolls, one of said rolls being movable with respect to the other to form an adjustable width nip, the improvement comprising: a single-acting loading device having a diaphragm dividing a single chamber into front and back chambers; a source of pressurized fluid in communication with the back chamber; a restricter connected between said source and said back chamber; and a linkage passing through said front chamber and connected between said diaphragm and said movable roll.

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2. The apparatus as defined in claim 1, said restricter being located adjacent said back chamber.

3. The apparatus as defined in claim 2, said fluid being a gas.

4. The apparatus as defined in claim 3, said gas being air.

5. In an apparatus for crimping filamentary tow including a pair of driven rolls cooperating to form a nip between the rolls through which tow passes to a crimper chamber associated with said rolls, one of said rolls being movable with respect to the other to form an adjustable width nip, the improvement comprising: a single-acting loading device having a flexible diaphragm dividing a single chamber into a front chamber and a sealed back chamber; a source of pressurized air in communication with the back chamber; a gas flow restricter connected between said source and said back chamber adjacent to said back chamber; and a linkage passing through said front chamber connected between the central portion of said diaphragm and said movable roll.

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